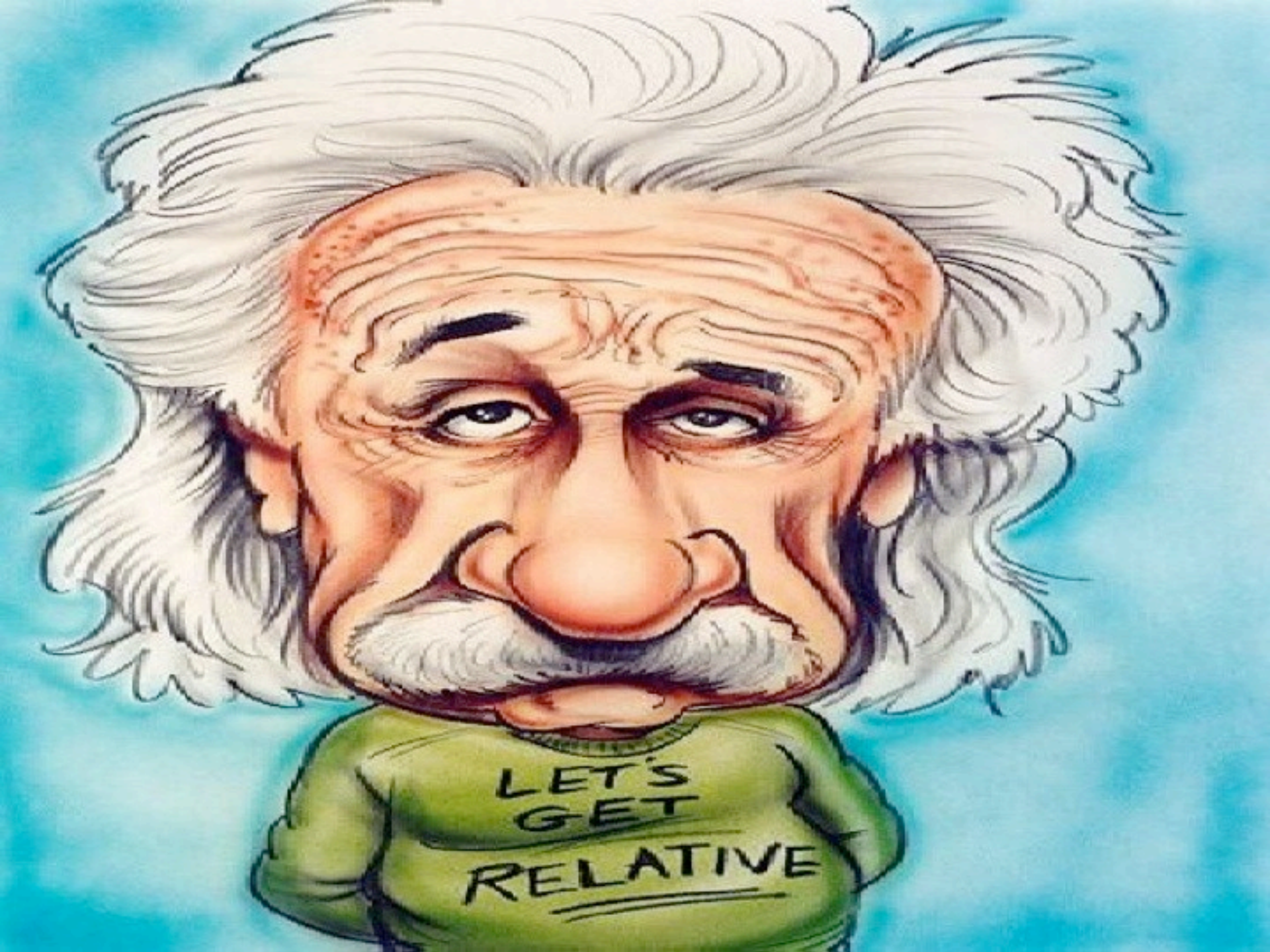


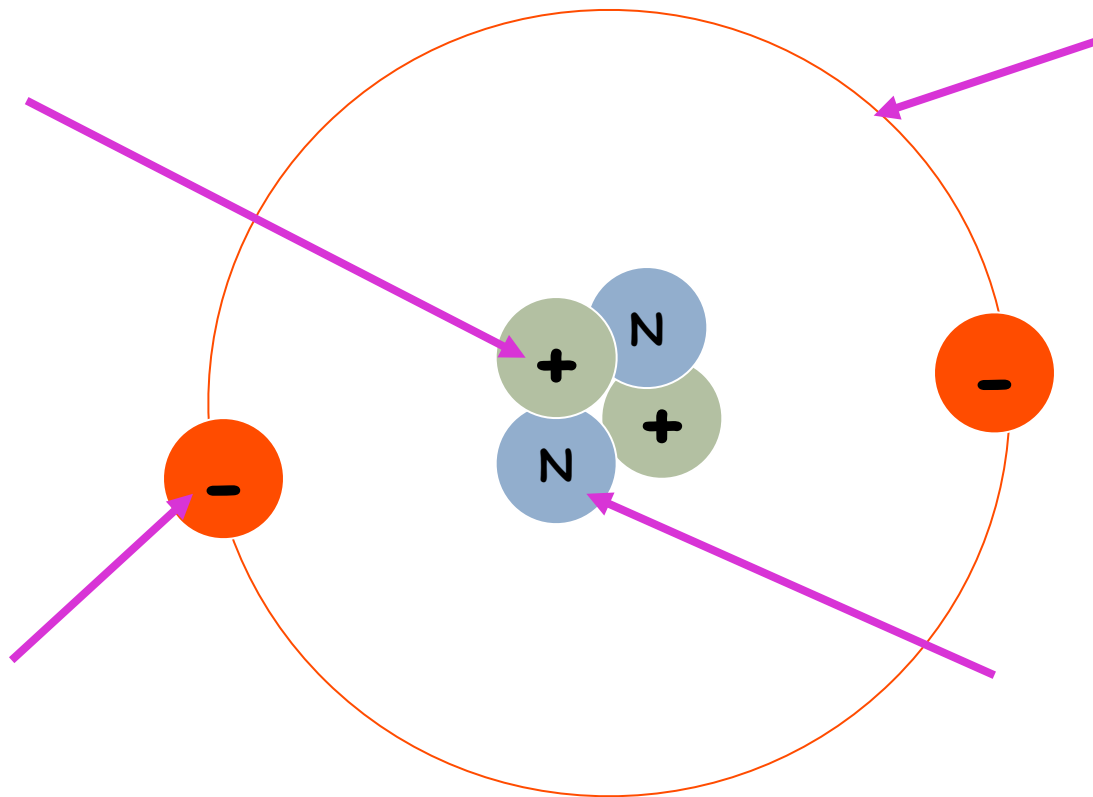
- DSHS Physical Science

-

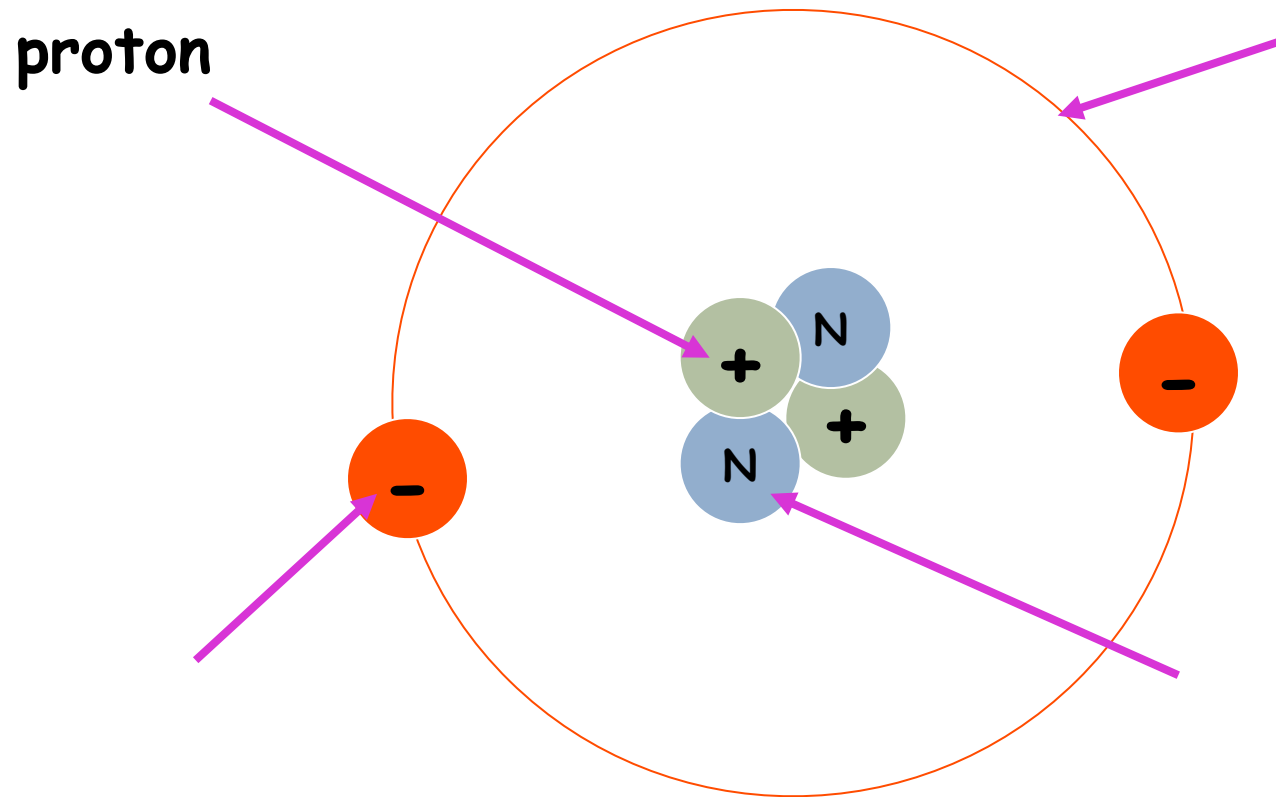


Monday, January 20, 14

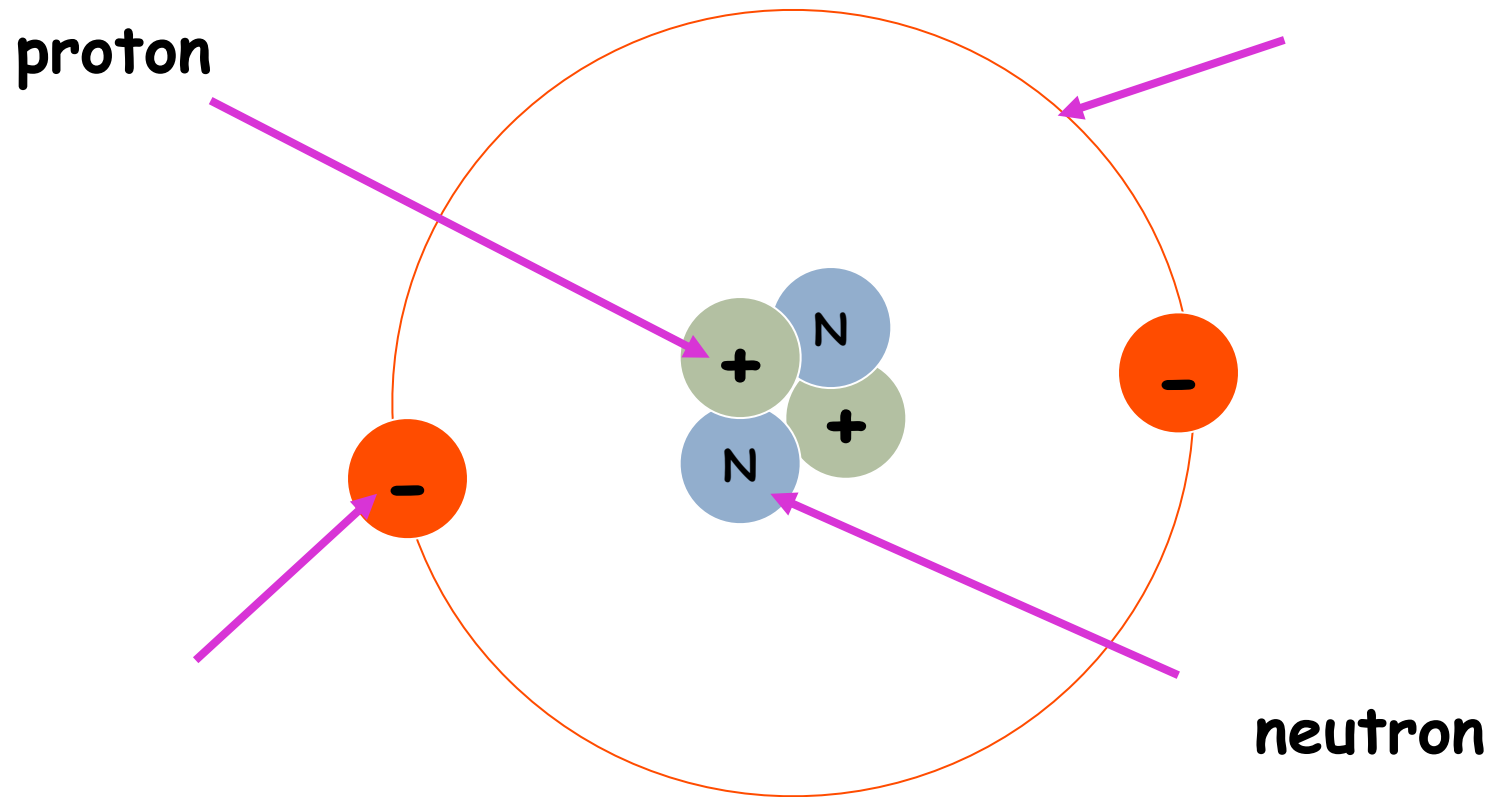
I. The Atom



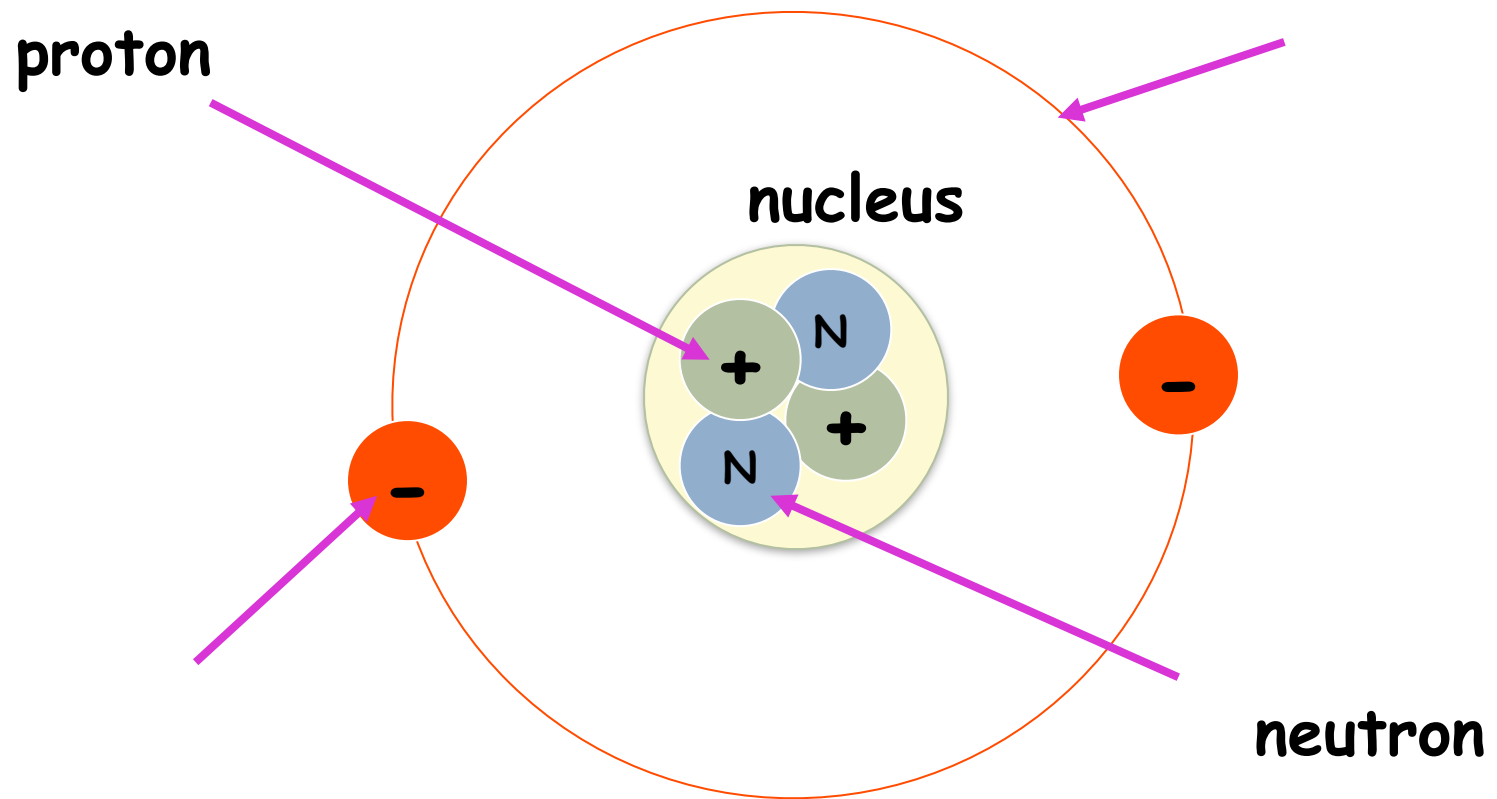
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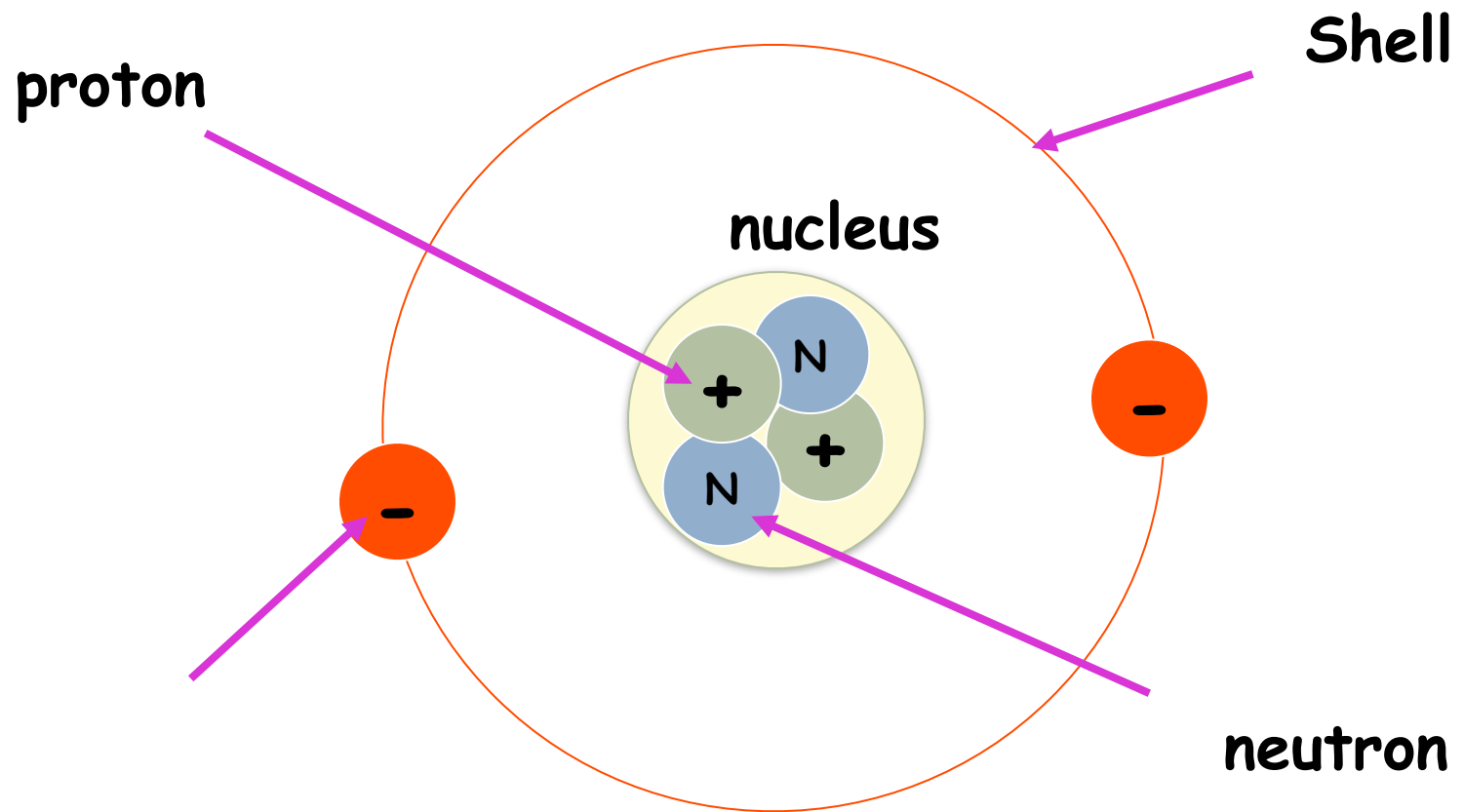
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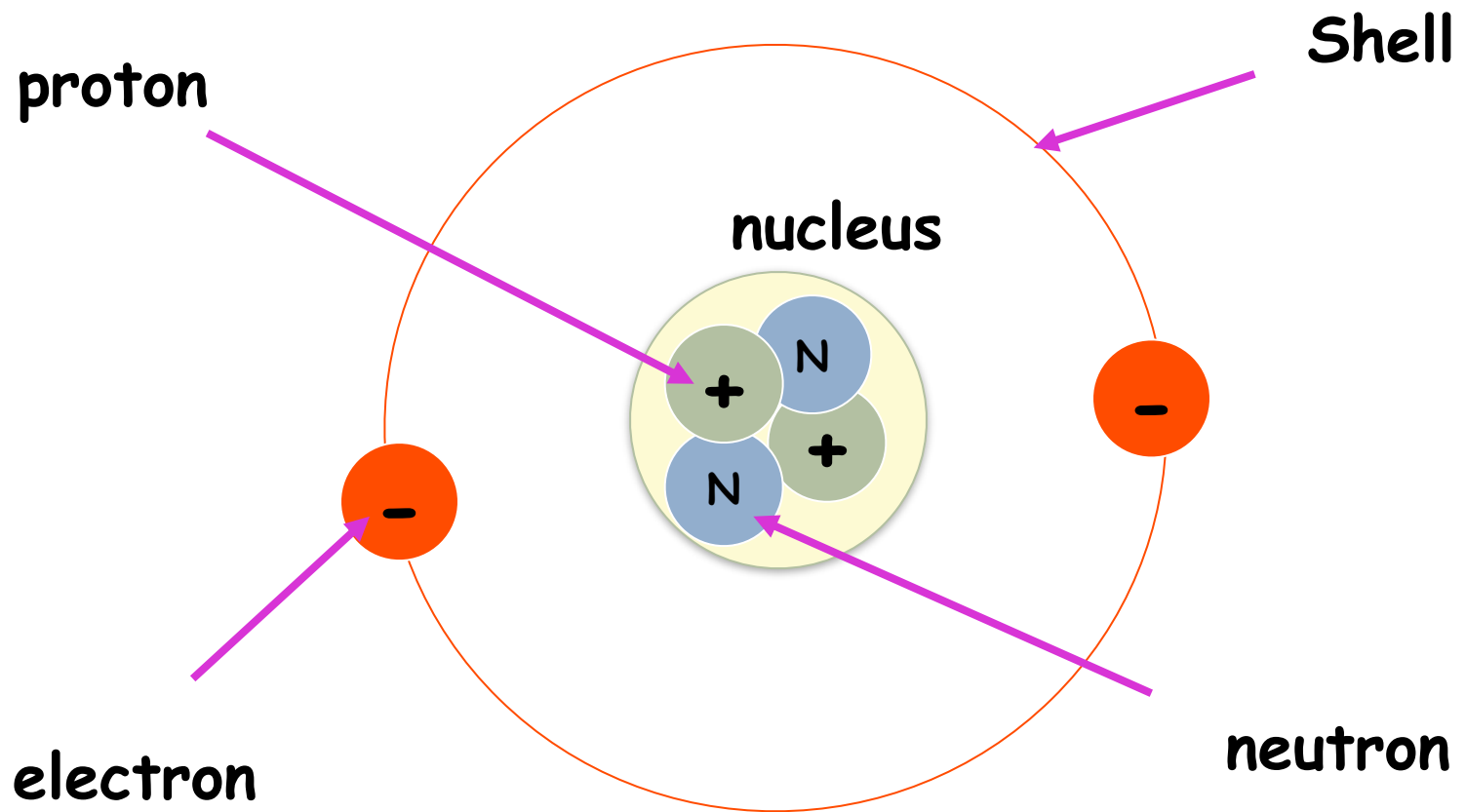
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II. Timeline of the Atom

A. 460 BC Democritus develops idea of atoms

1. he pounded up materials until he reduced them to smaller and smaller particles which he called

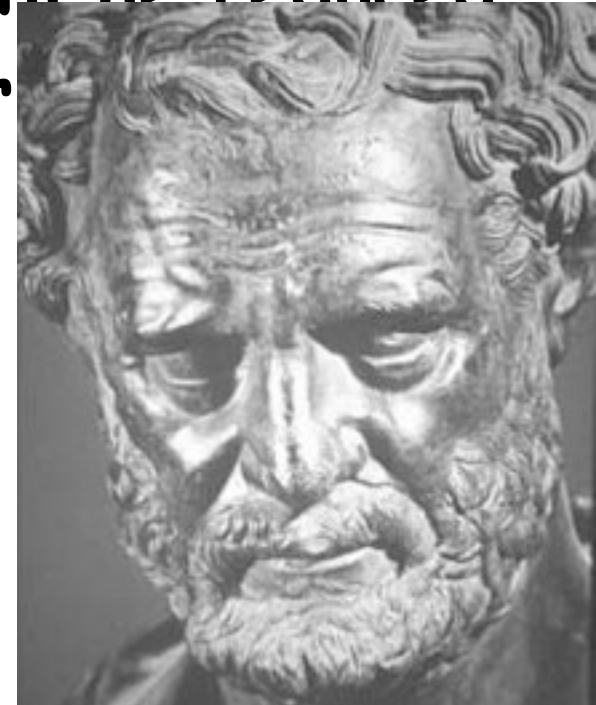
ATOMS

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B. 1808 John Dalton - English school teacher suggested that all matter was made up of tiny spheres that were able to bounce around with perfect elasticity and called them

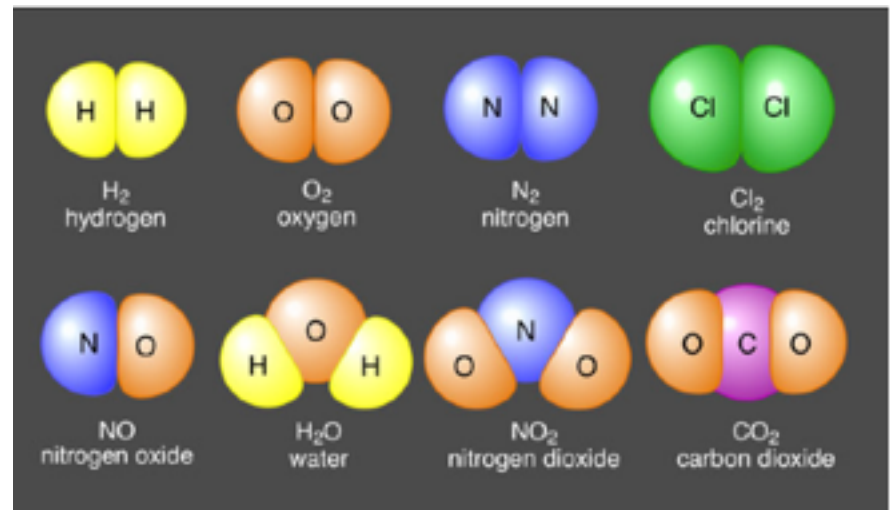
ATOMS

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ATOMS

2. Atoms of a given element are exactly alike -
Atoms can join together (like or different types of atoms) the result is a molecule. -
When atoms of different types (different elements) join together, this is called a compound.



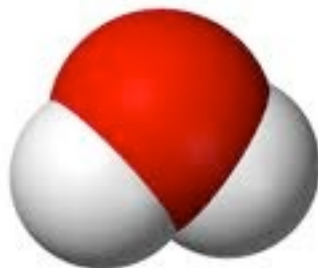
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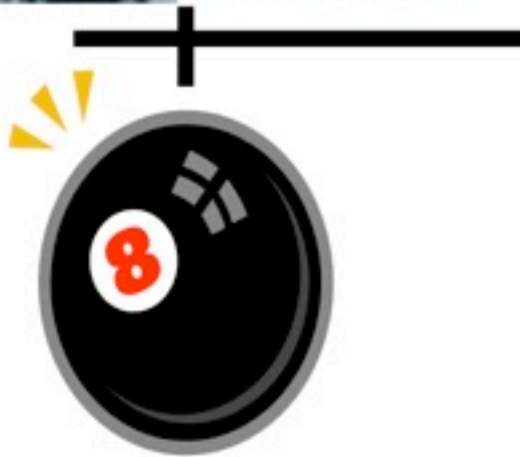


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History of the Atom Timeline

**Democritus 460 BC
and Dalton 1803 AD**



C. 1898 J. J. Thompson - British scientist

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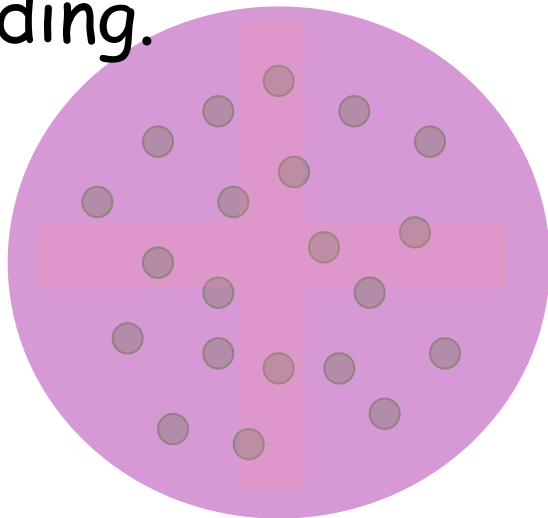


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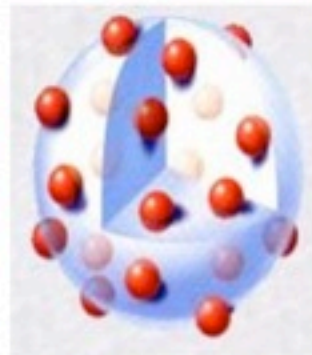
PLUM PUDDING

History of the Atom Timeline

Democritus 460 BC
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Thomson
1897



E. 1910 Ernest Rutherford

1. Tested Thomson's plum pudding model: Gold Foil Experiment

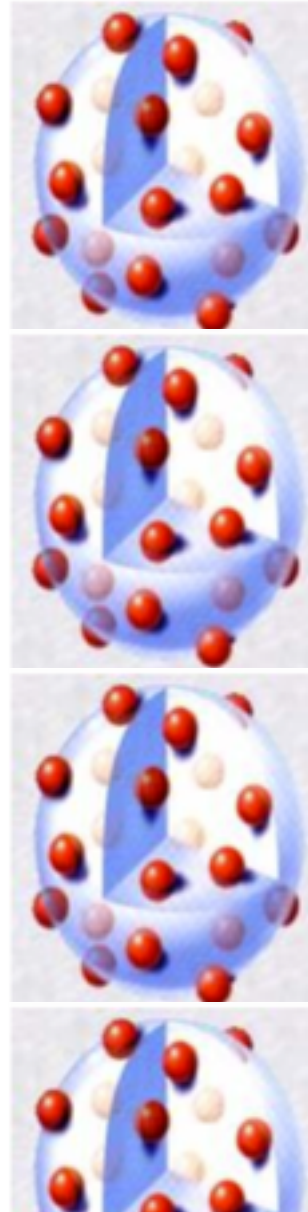
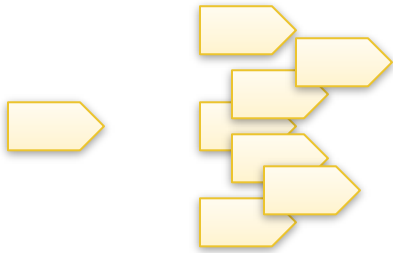
☒ fired Helium nuclei (alpha particles) at a piece of gold foil which was only a few atoms thick.

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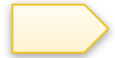
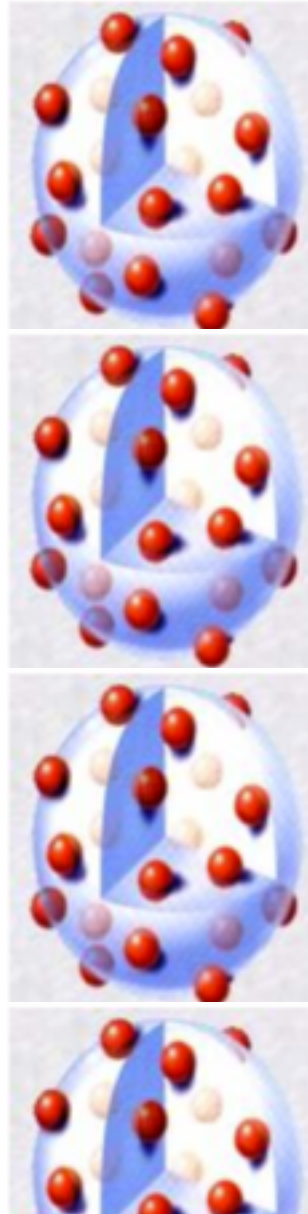
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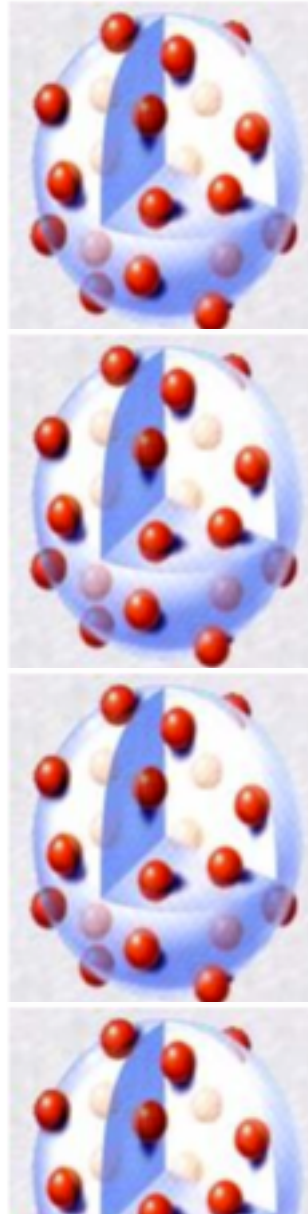
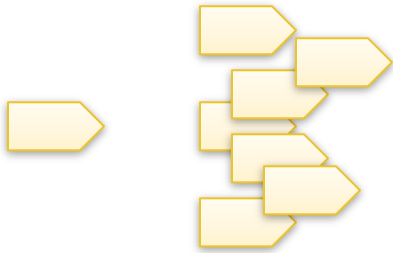


Most go straight
through while some get
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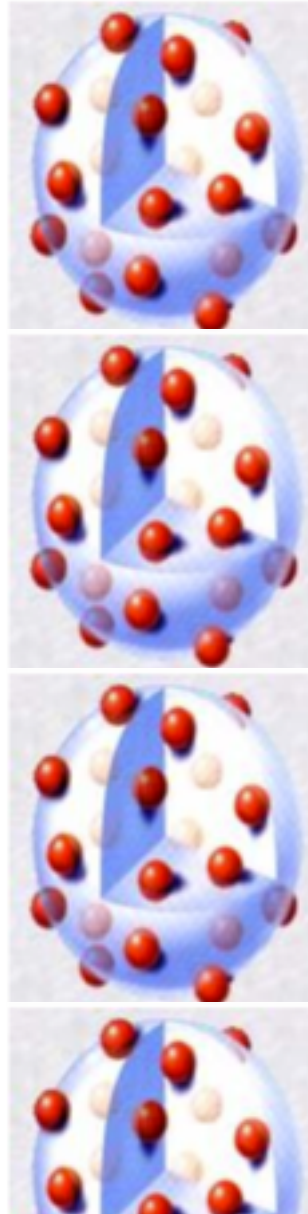


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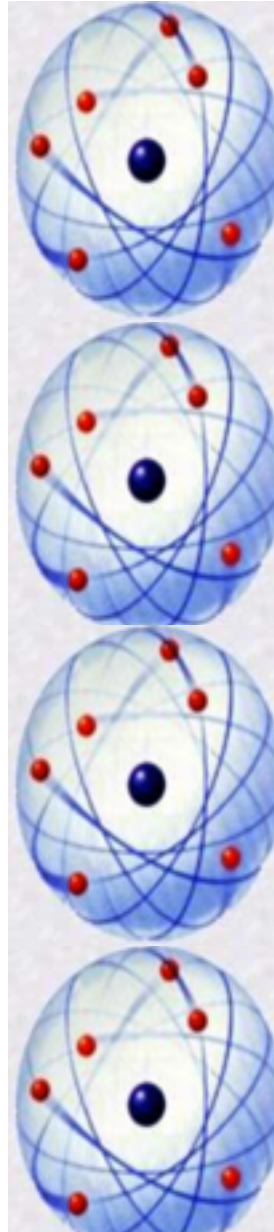
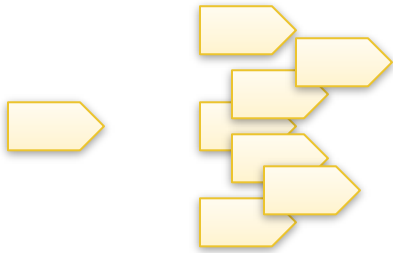
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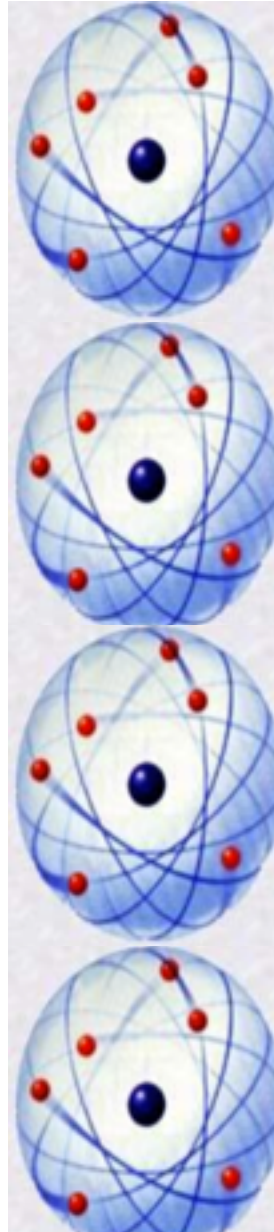


What this meant....



Thompson's Plum pudding model was wrong. Instead, they concluded that there had to be something very massive that causes particles to bounce back.

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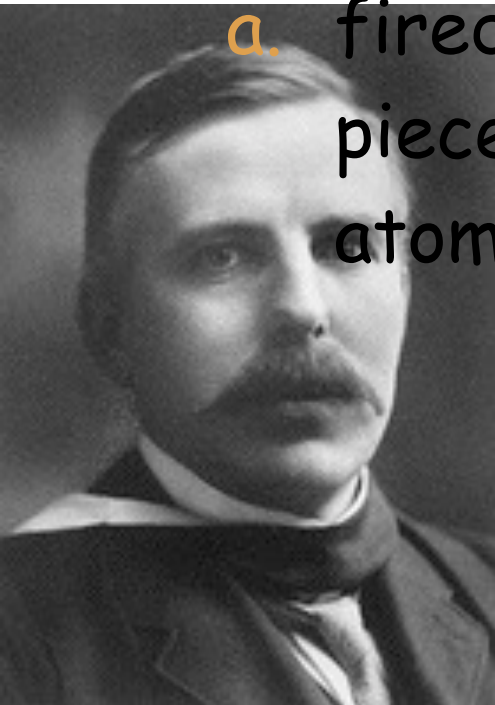
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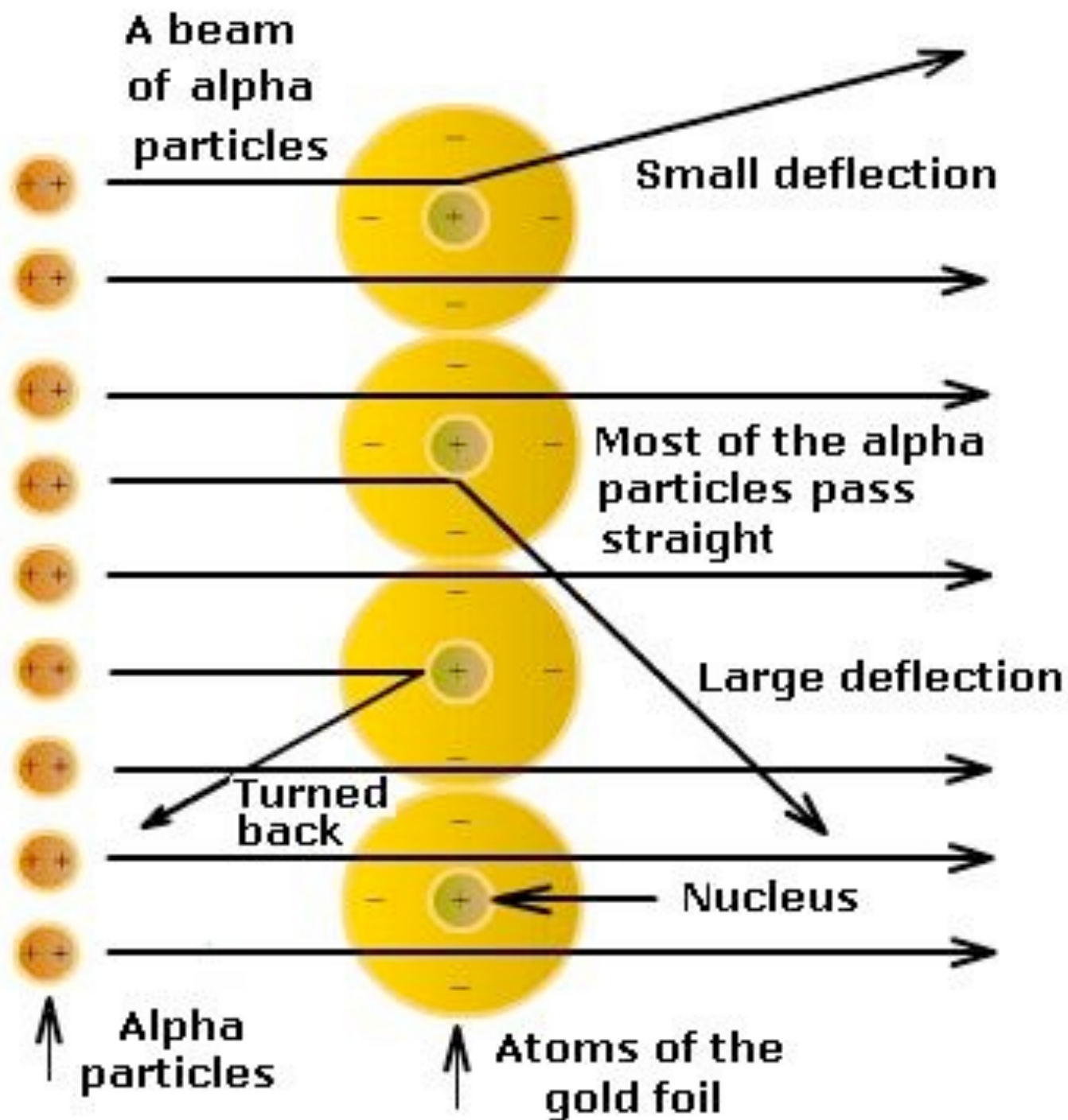
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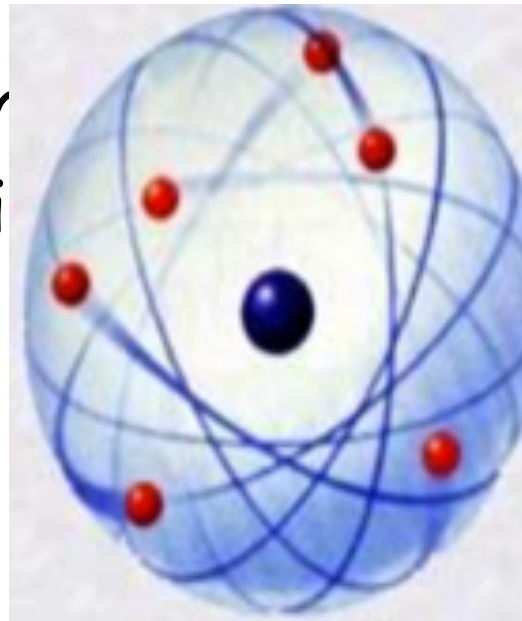


Rutherford Experiment: Nuclear Atom

b. Rutherford's proposed a more detailed model with a **central nucleus**.

i. **positive charge** was all in a central nucleus.

ii. Electrons are attracted to the nucleus by electrical



History of the Atom Timeline

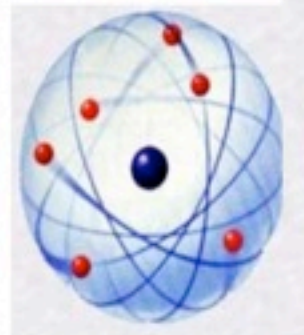
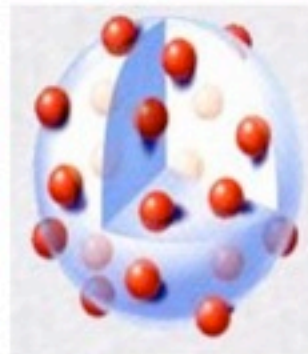
Democritus 460 BC
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Rutherford
1912

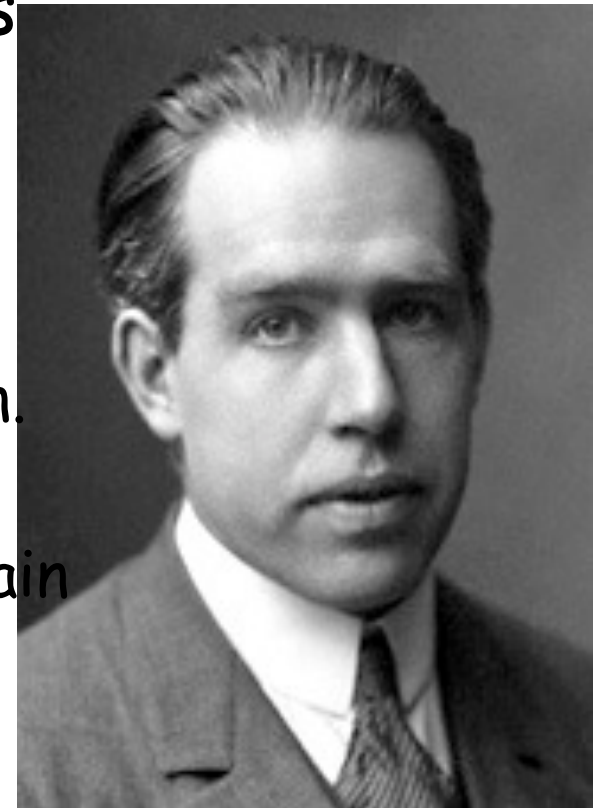


F. 1913 Niels Bohr - studied under Rutherford

1. Bohr refined Rutherford's idea by adding that the electrons were in **orbits**.
 - a. Like planets orbiting the sun.
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History of the Atom Timeline

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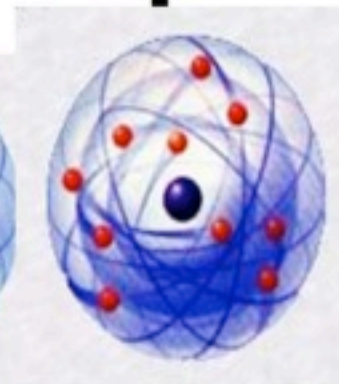
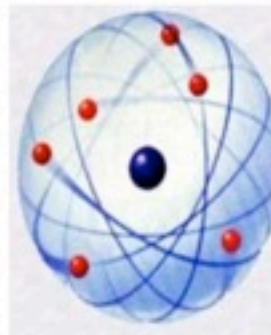
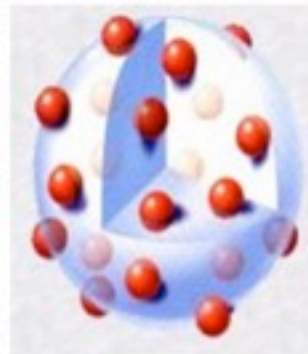
**Thomson
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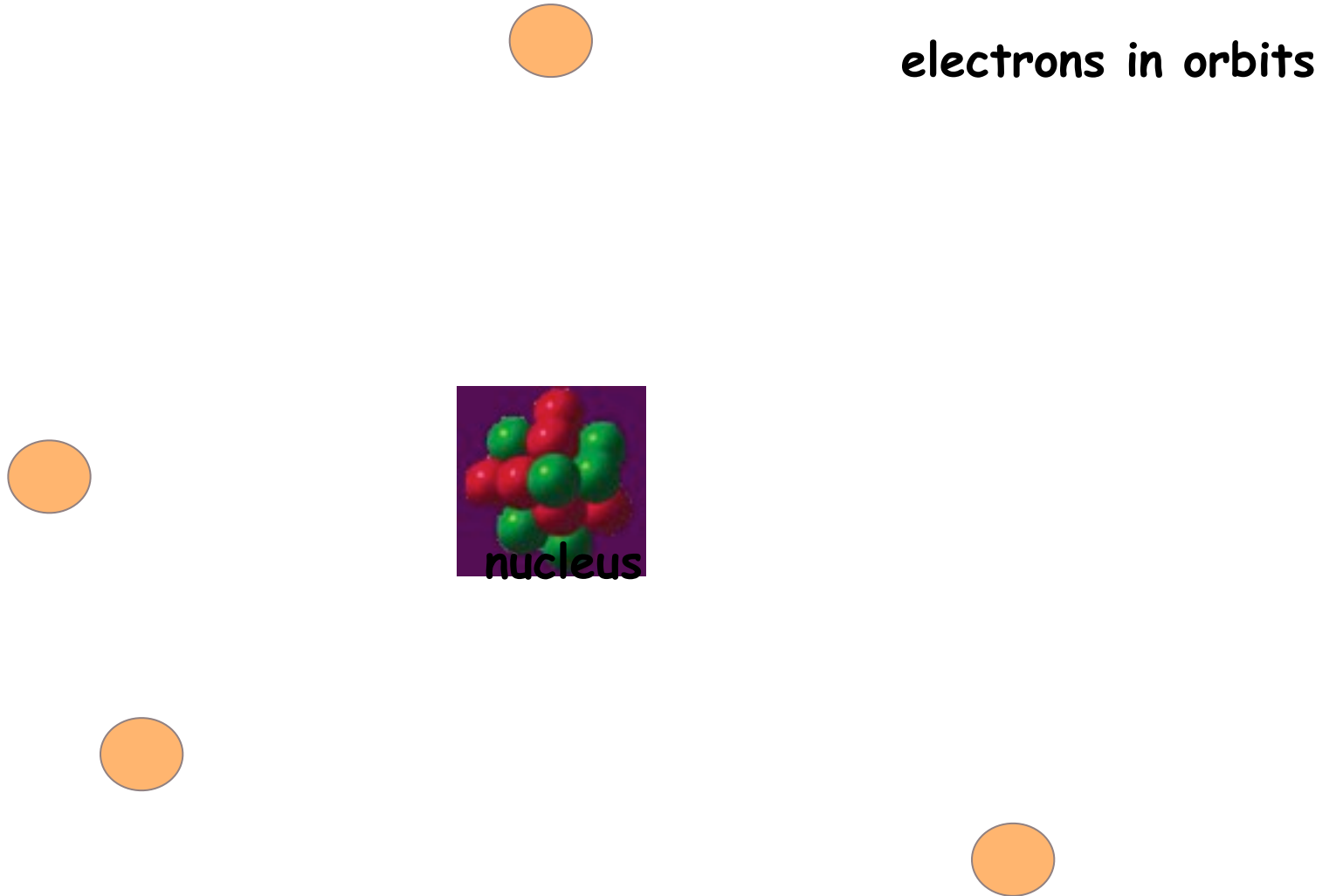
**Rutherford
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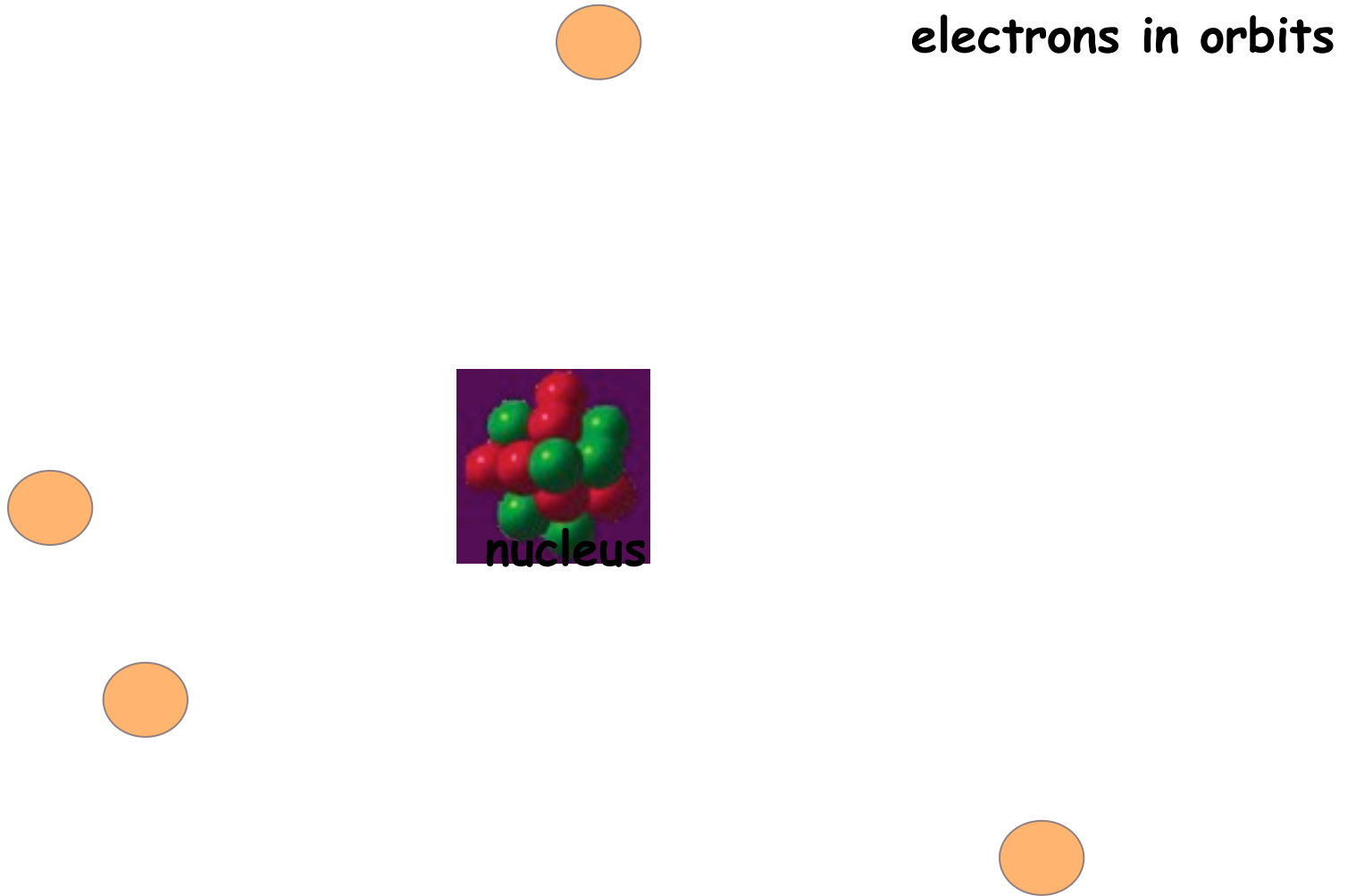
**Bohr
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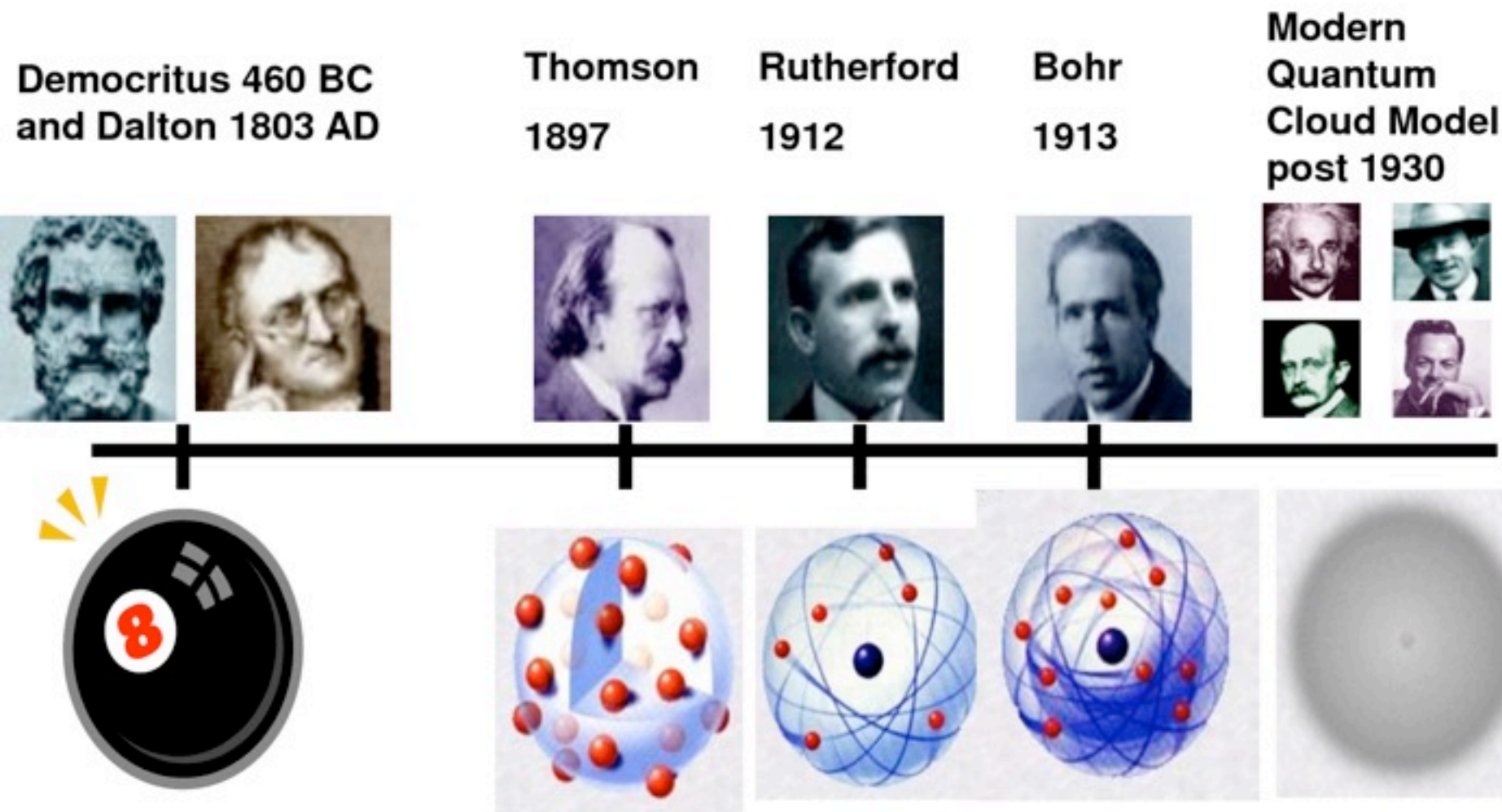
Bohr's Atom



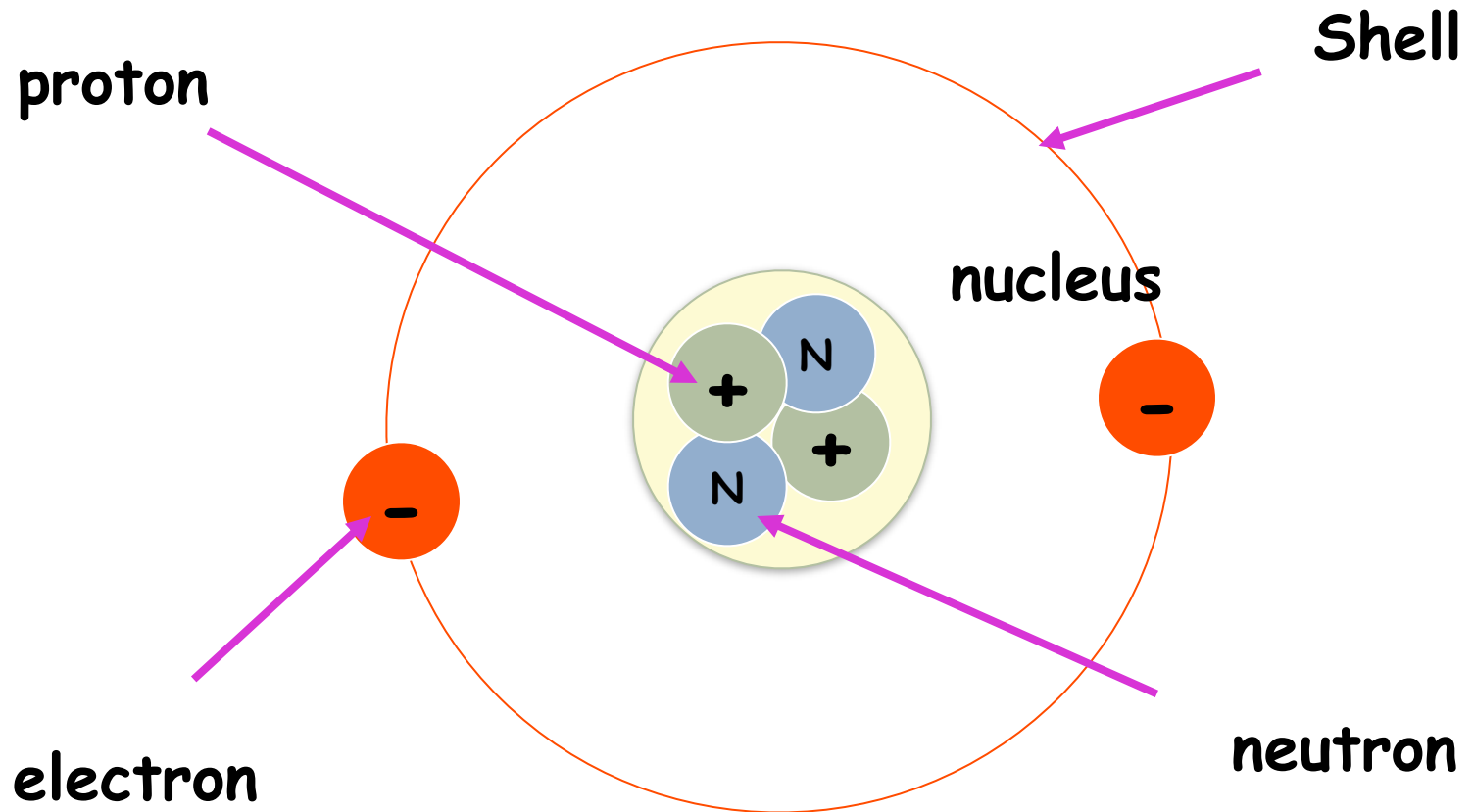
Bohr's Atom



History of the Atom Timeline



HELIUM ATOM



III. Atomic Structure

Particle	Charge	Mass
proton		
neutron		
electron		

III. Atomic Structure

Particle	Charge	Mass
proton	+ charge	1
neutron		
electron		

III. Atomic Structure

Particle	Charge	Mass
proton	+ charge	1
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electron		

III. Atomic Structure

Particle	Charge	Mass
proton	+ charge	1
neutron	No charge	1
electron	- charge	nil

A. Atomic Shorthand



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Atomic number

the number of protons

A. Atomic Shorthand



Atomic mass number

Atomic number

the number of protons

A. Atomic Shorthand



Atomic mass number

the number of protons and
neutrons

Atomic number

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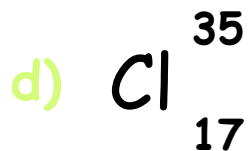
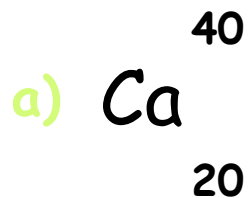
Atomic number

the number of protons

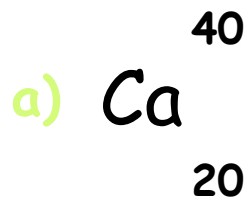
IN A STABLE ATOM

number of electrons = number of protons

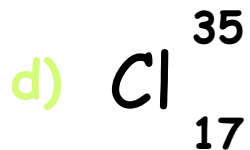
- Determine the number of protons, neutrons and electrons in each stable atom



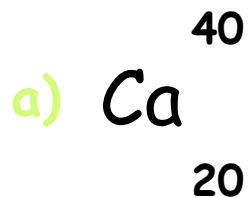
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20, 20, 20



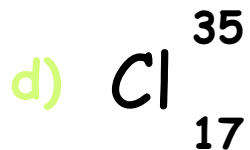
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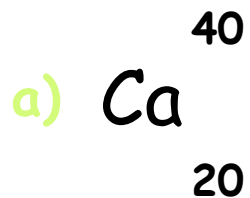
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11, 12, 11



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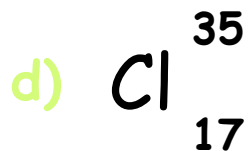
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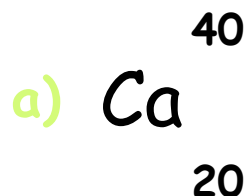
11, 12, 11



8, 8, 8



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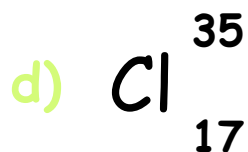
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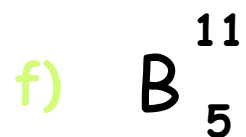
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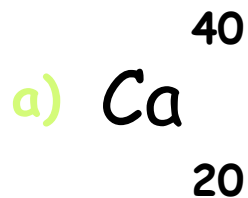
8, 8, 8



17, 18, 17



- Determine the number of protons, neutrons and electrons in each stable atom



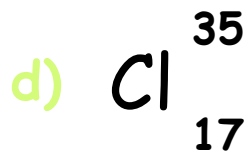
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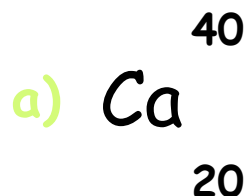
17, 18, 17



14, 14, 14



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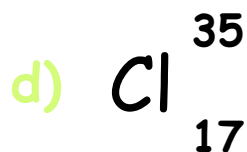
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5, 6, 5

B. Electrons Shells: or Energy Levels determine how electrons are arranged around the nucleus

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- first shell a maximum of **2** electrons

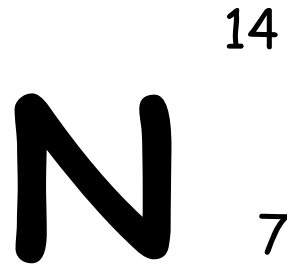
B. Electrons Shells: or Energy Levels determine how electrons are arranged around the nucleus

- first shell a maximum of 2 electrons
- second shell a maximum of 8 electrons

B. Electrons Shells: or Energy Levels determine how electrons are arranged around the nucleus

- first shell ~~a~~ maximum of 2 electrons
- second shell → a maximum of 8 electrons
- third shell → a maximum of 8 electrons

I. Electrons fills lower shells before outer shells



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Nitrogen



1st shell - 2

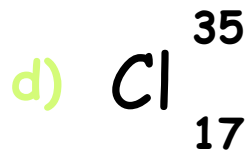
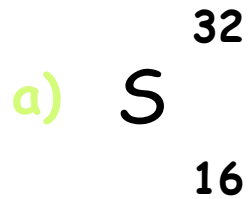
2nd shell - 5

3rd shell - 0

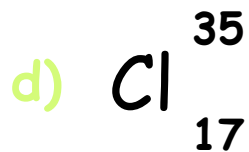
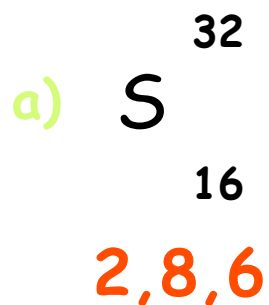
$$2 + 5 + 0 = \textcircled{7}$$



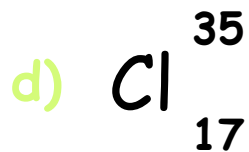
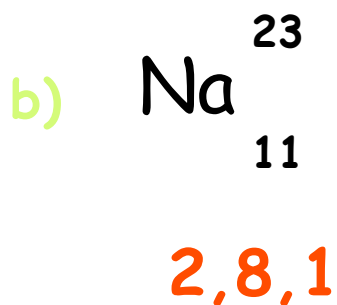
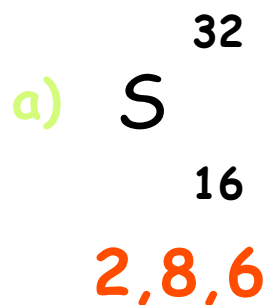
- Indicate the number of electrons in each shell



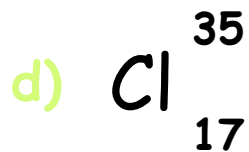
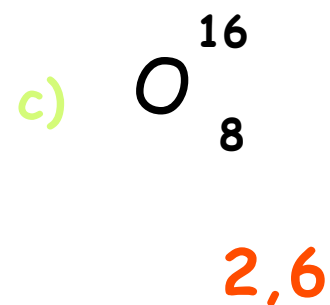
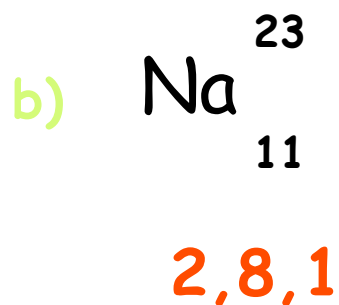
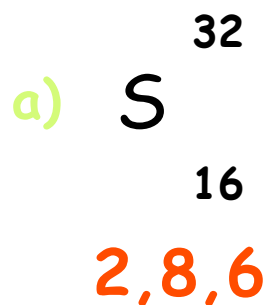
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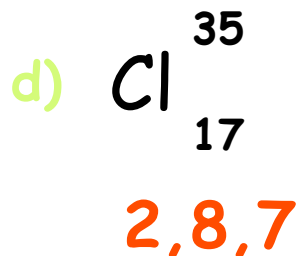
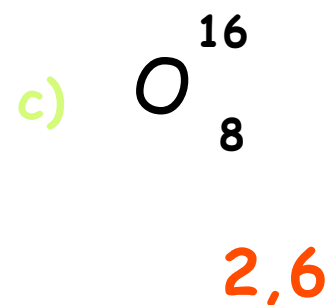
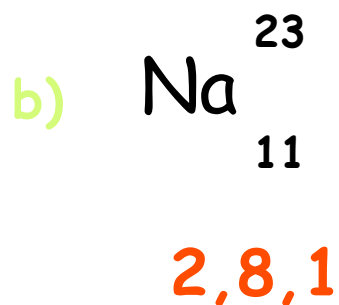
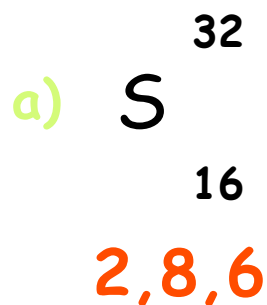
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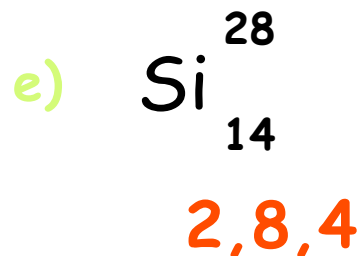
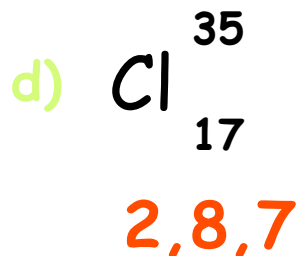
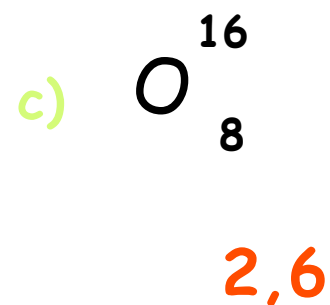
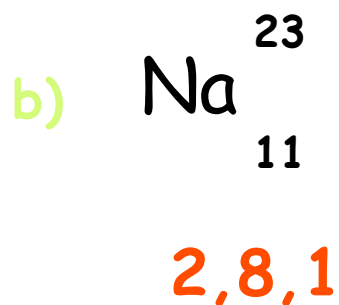
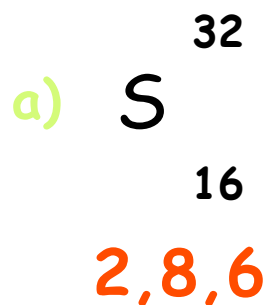
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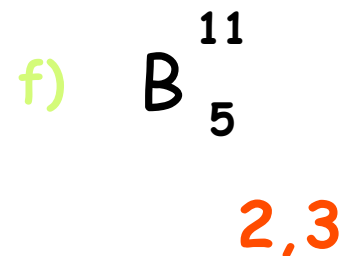
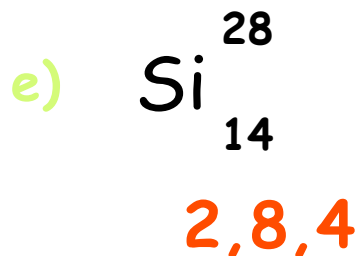
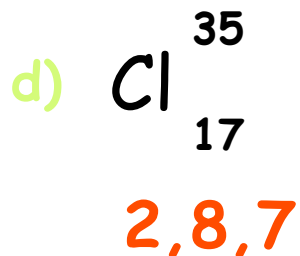
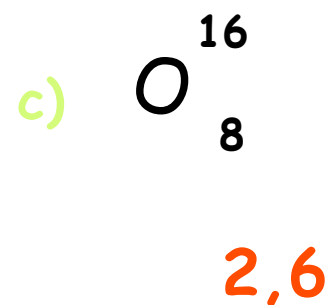
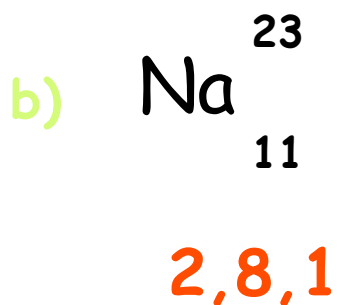
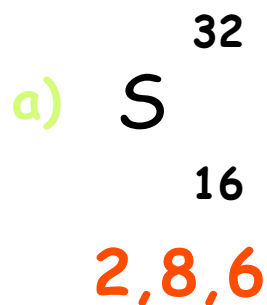
- Indicate the number of electrons in each shell



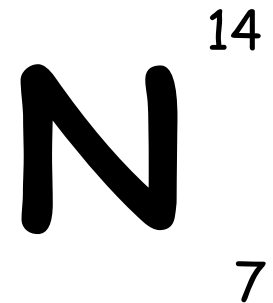
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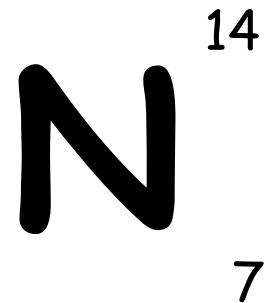


C. Bohr model shows elements represented by crosses to show electrons, and circles to show the shells. For example;



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Nitrogen



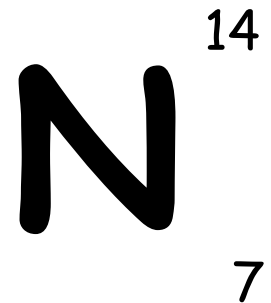
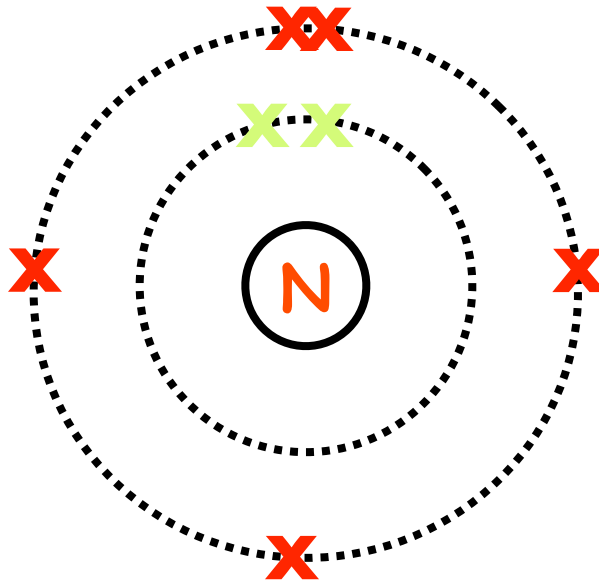
C. Bohr model shows elements represented by crosses to show electrons, and circles to show the shells. For example;

Nitrogen

1st shell - 2

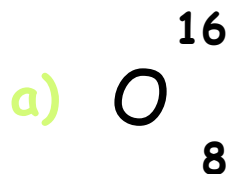
2nd shell - 5

3rd shell - 0



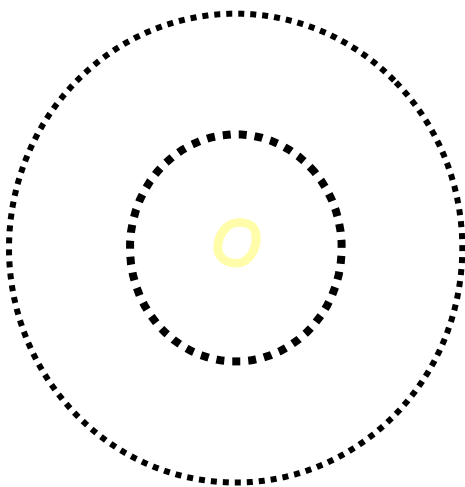
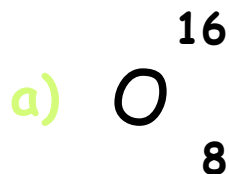
Bohr Model & CROSS DIAGRAMS

Draw the Dot & Cross diagrams for the following elements;



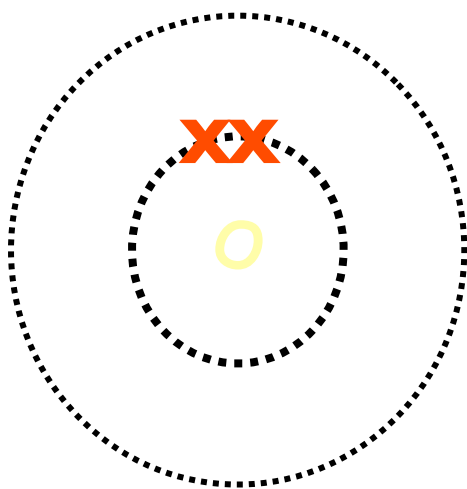
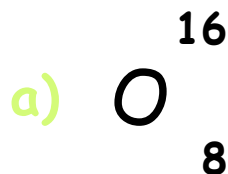
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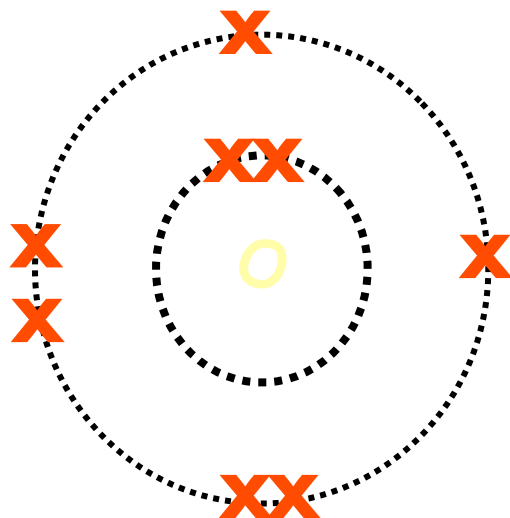
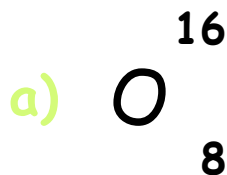
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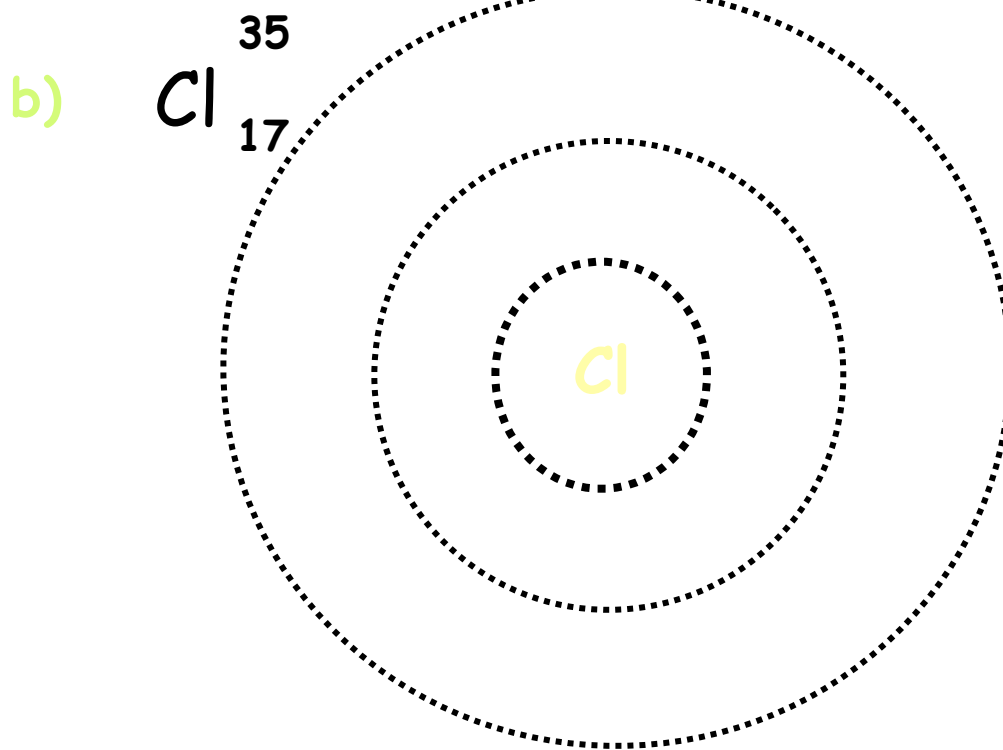
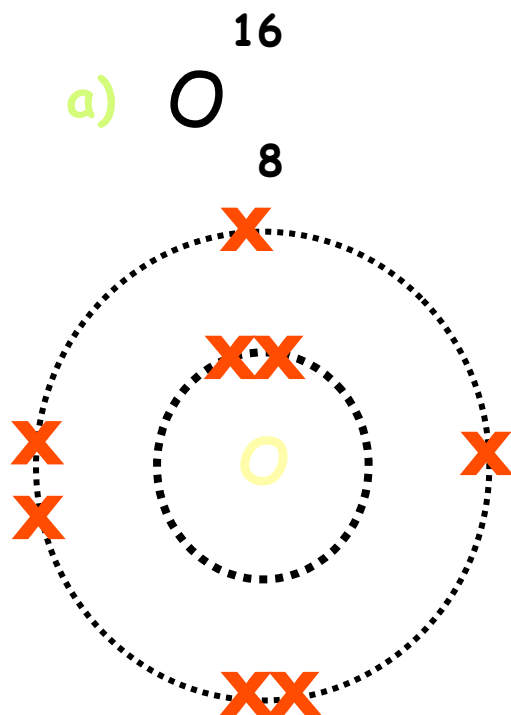
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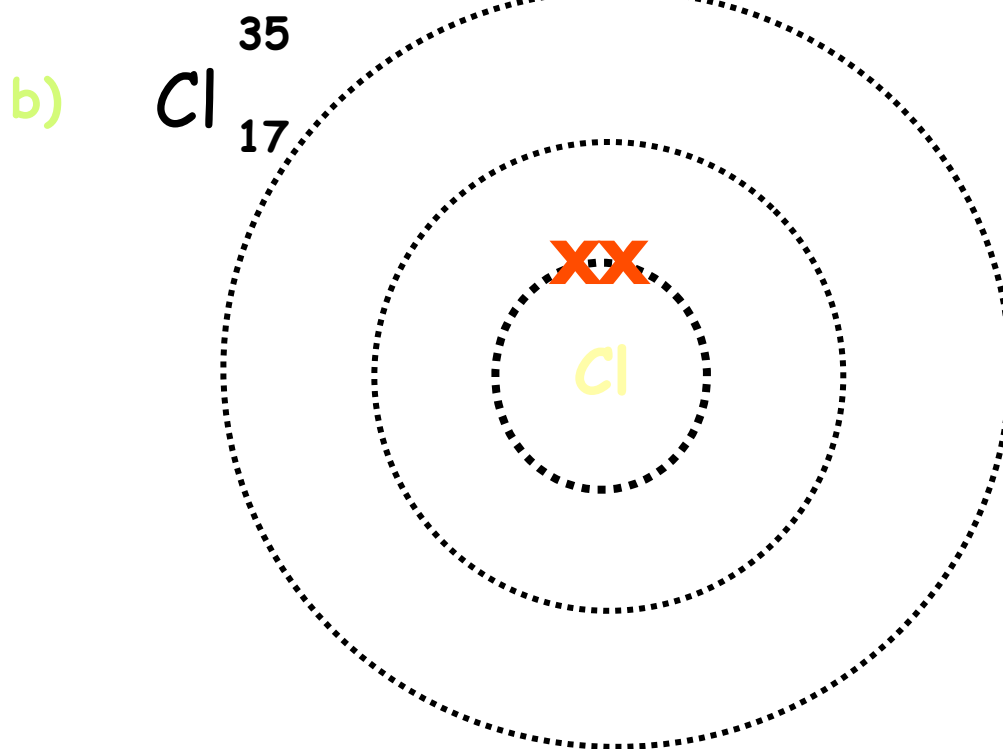
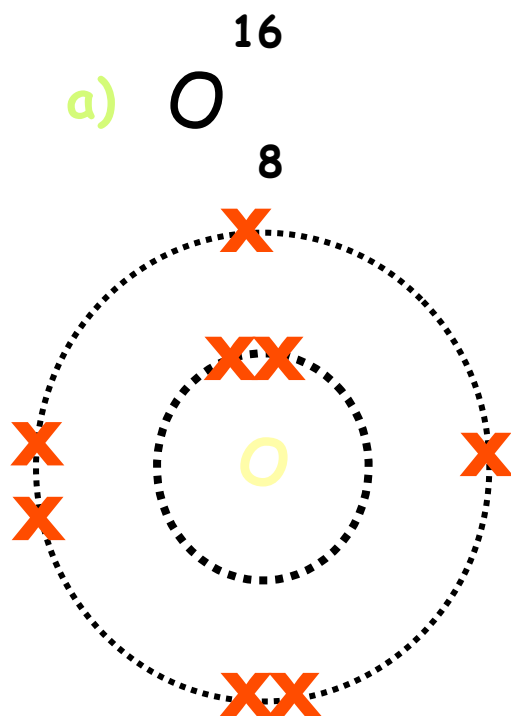
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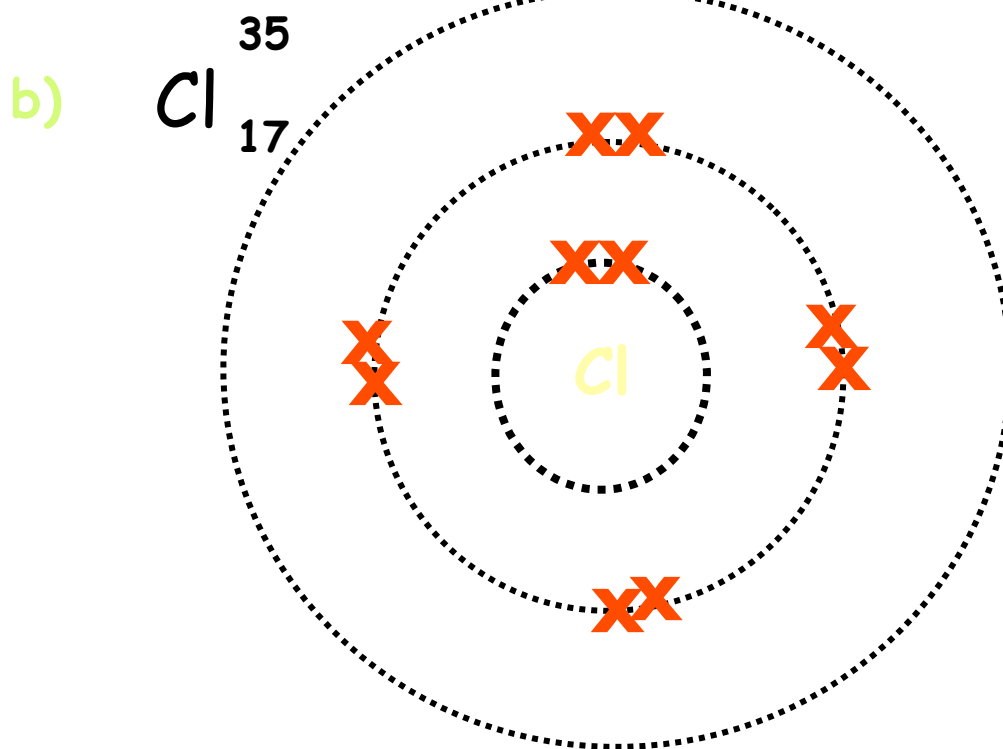
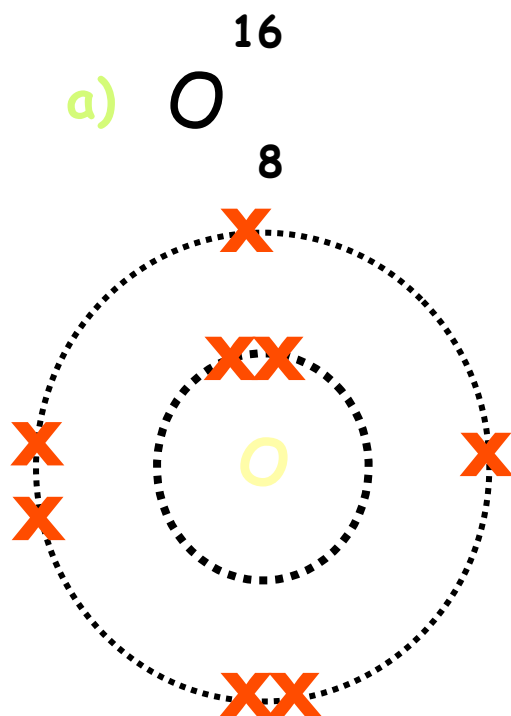
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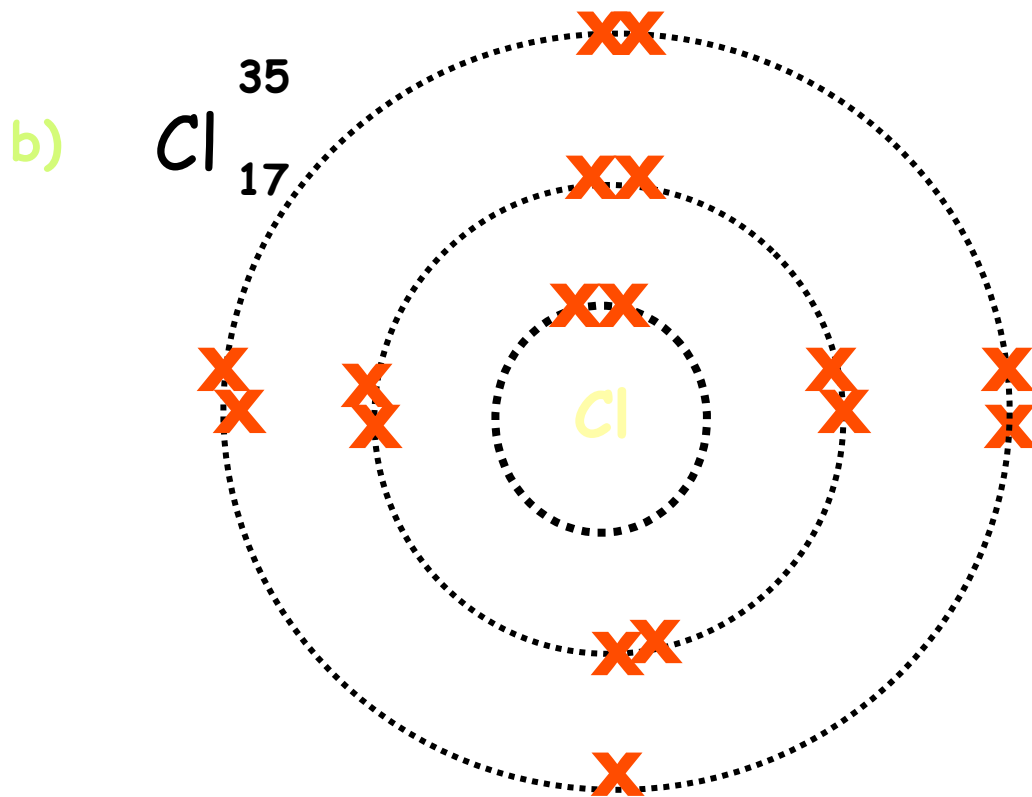
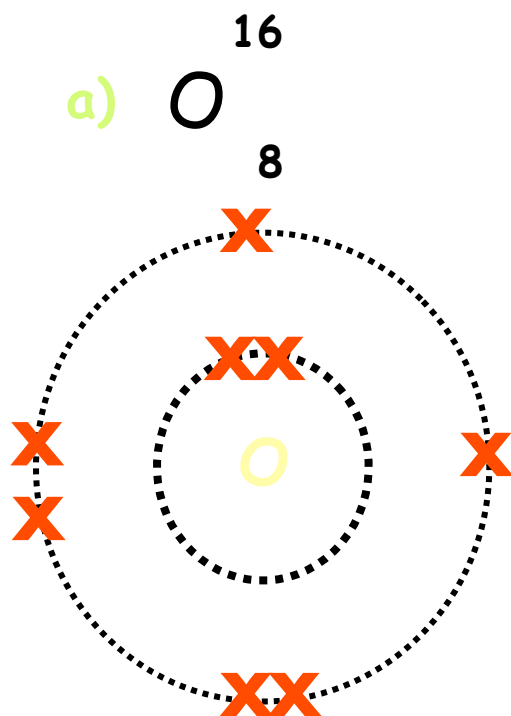
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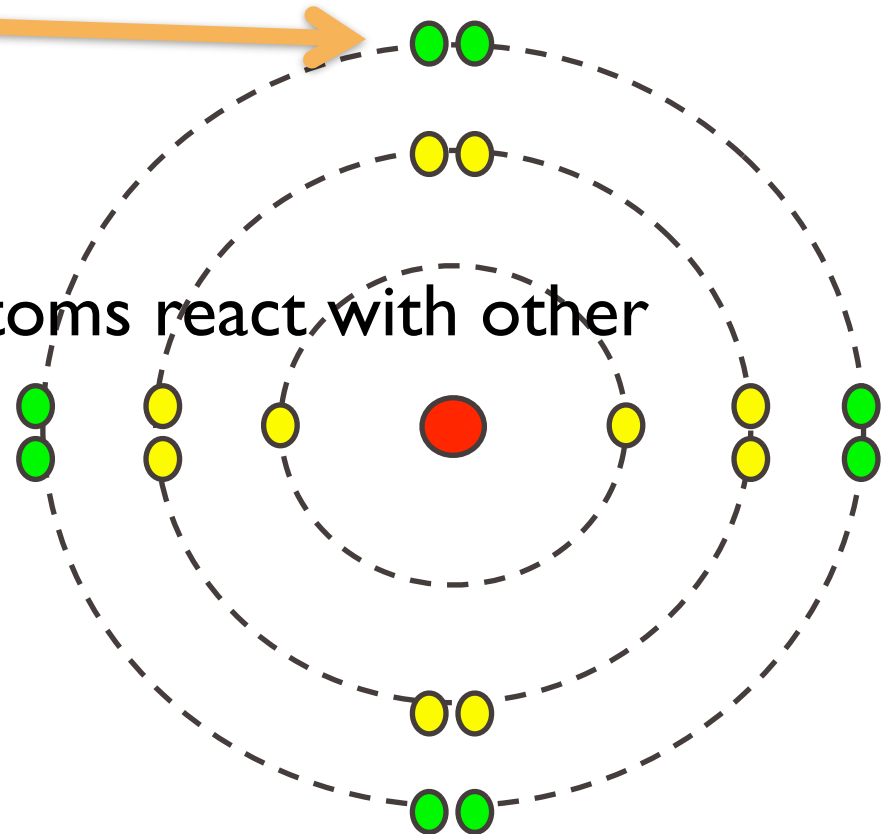
Bohr Model & CROSS DIAGRAMS

Draw the Dot & Cross diagrams for the following elements;



D. Valance Electrons: Electrons in the outer most shell

I. Determines how atoms react with other atoms

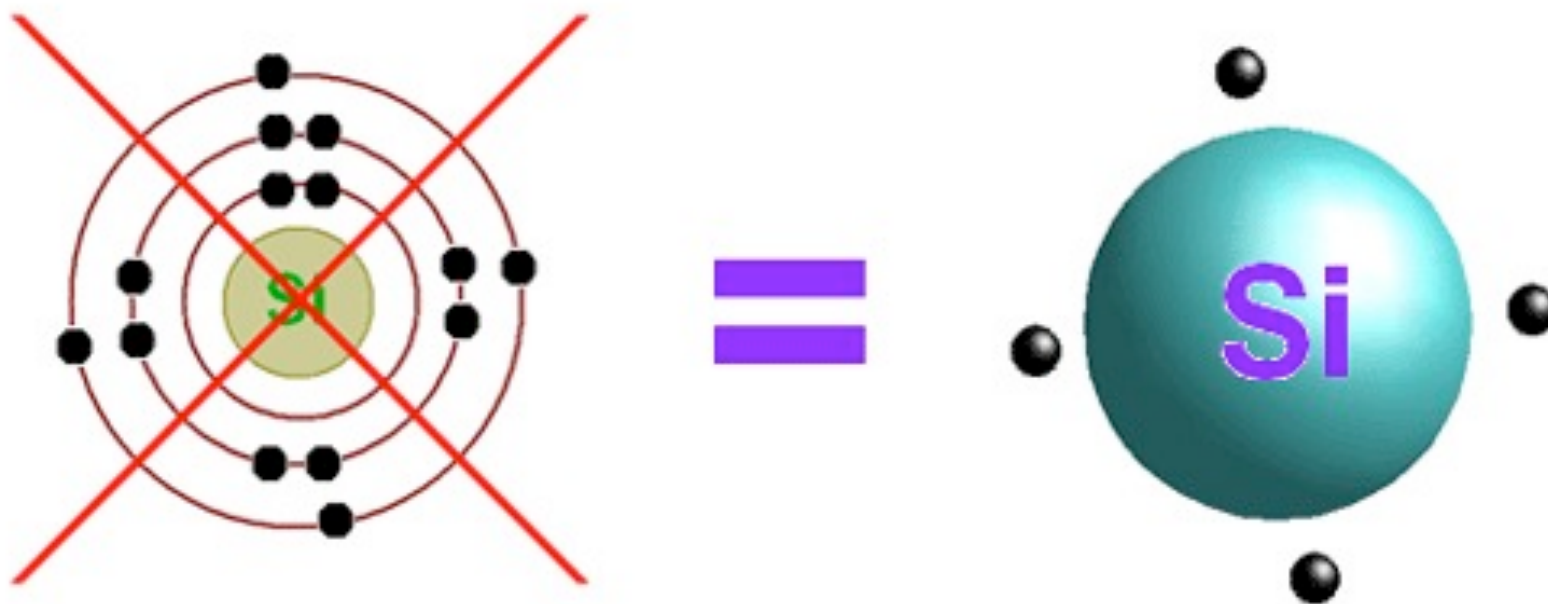


❖ To find # of Valance electrons count across the top of the periodic table (skipping the transition metals in the "d - block").

1 2 ... 3 4 5 6 7 8

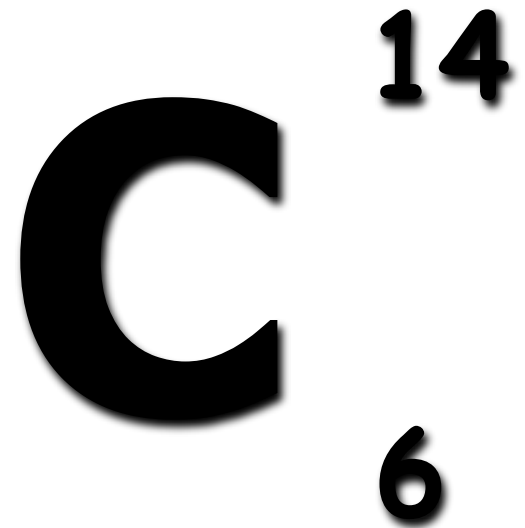
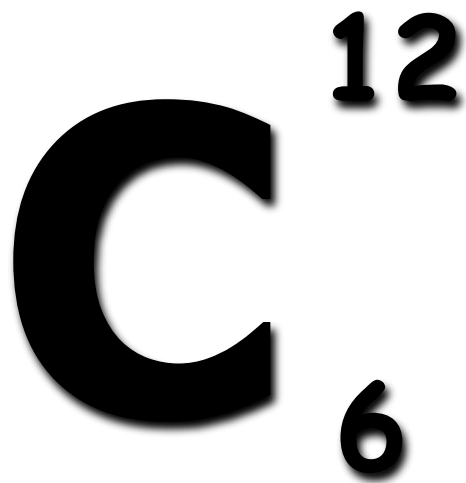
hydrogen 1 H 1.0079							helium 2 He 4.0026
lithium 3 Li 6.941	beryllium 4 Be 9.0122	boron 5 B 10.811	carbon 6 C 12.011	nitrogen 7 N 14.007	oxygen 8 O 15.999	fluorine 9 F 18.998	neon 10 Ne 20.180
sodium 11 Na 22.990	magnesium 12 Mg 24.305	aluminium 13 Al 26.982	silicon 14 Si 28.086	phosphorus 15 P 30.974	sulfur 16 S 32.065	chlorine 17 Cl 35.453	argon 18 Ar 39.948
potassium 19 K 39.098	calcium 20 Ca 40.078	gallium 31 Ga 69.723	germanium 32 Ge 72.61	arsenic 33 As 74.922	selenium 34 Se 78.96	bromine 35 Br 79.904	krypton 36 Kr 83.80
rubidium 37 Rb 85.468	strontium 38 Sr 87.62	indium 49 In 114.82	tin 50 Sn 118.71	antimony 51 Sb 121.76	tellurium 52 Te 127.60	iodine 53 I 126.90	xenon 54 Xe 131.29
caesium 55 Cs 132.91	barium 56 Ba 137.33	thallium 81 Tl 204.38	lead 82 Pb 207.2	bismuth 83 Bi 208.98	polonium 84 Po [209]	astatine 85 At [210]	radon 86 Rn [222]
francium 87 Fr [223]	radium 88 Ra [226]		ununquadium 114 Uuq [289]				

E. Lewis Dot Model: showing an atom using only the valence electrons.



- E. Isotopes: Elements with equal protons but different number of neutrons.

EX CARBON

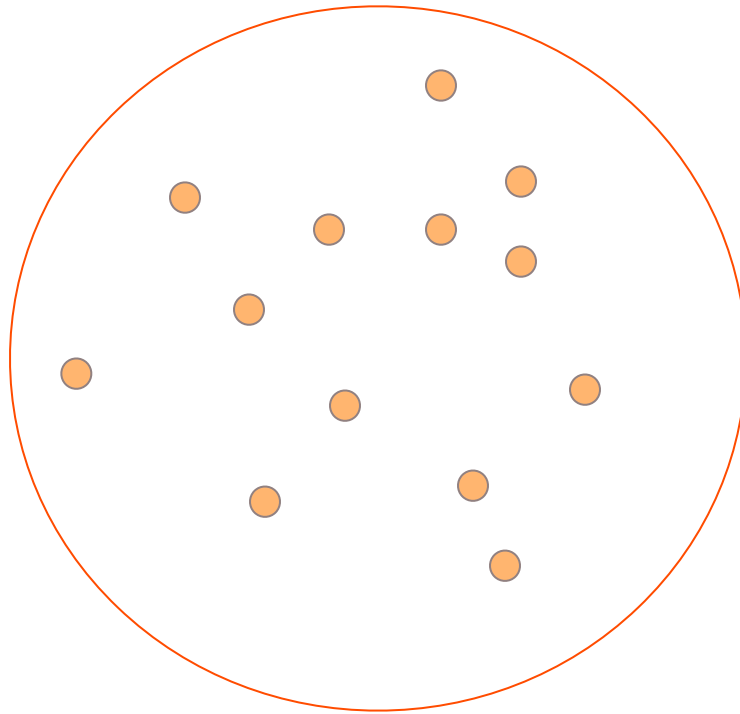


- ❖ Outer shells are most stable when full.
Atoms will react with other atoms to become more stable.
- ❖ The charge of the atom is how many electrons it will give/donate or take /accept from other atoms
- ❖ If the charge is + the atom has electrons to donate

QUARKS

THE SUB-ATOMIC PARTICLES THAT
MAKE UP PROTONS AND NEUTRONS.

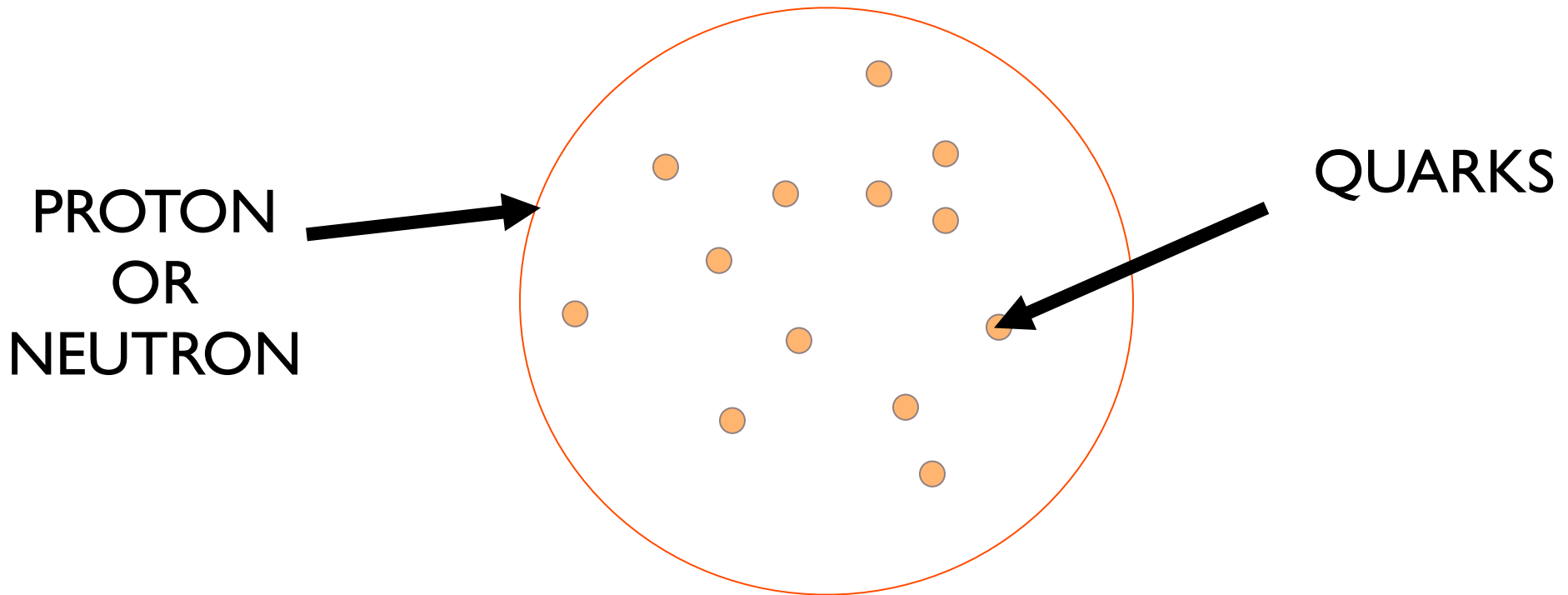
PROTON
OR
NEUTRON



QUARKS

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THE SUB-ATOMIC PARTICLES THAT
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SUMMARY



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1.



number of an atom = number of
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SUMMARY CONTINUED





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7. A  is a sub-atomic particle that makes up Protons and Neutrons



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